



UNITED STATES PATENT AND TRADEMARK OFFICE

UNITED STATES DEPARTMENT OF COMMERCE
United States Patent and Trademark Office
Address: COMMISSIONER FOR PATENTS
P.O. Box 1450
Alexandria, Virginia 22313-1450
www.uspto.gov

APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
-----------------	-------------	----------------------	---------------------	------------------

10/079,775

02/19/2002

Marina V. Plat

D900D/1368D

9123

7590

10/08/2004

Kelly K. Korzik
Winstead, Sechrest & Minick P.C.
P.O. Box 50784
1201 Main Street
Dallas, TX 75250-0784

EXAMINER

LEE, HSIEN MING

ART UNIT

PAPER NUMBER

2823

DATE MAILED: 10/08/2004

Please find below and/or attached an Office communication concerning this application or proceeding.

Office Action Summary

Application No.

10/079,775

Applicant(s)

PLAT ET AL.

Examiner

Hsien-Ming Lee

Art Unit

2823

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If the period for reply specified above is less than thirty (30) days, a reply within the statutory minimum of thirty (30) days will be considered timely.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

- 1) ☒ Responsive to communication(s) filed on 06 August 2004.
- 2a) ☐ This action is FINAL. 2b) ☒ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

- 4) ☒ Claim(s) 1-6 and 13-18 is/are pending in the application.
- 4a) Of the above claim(s) _____ is/are withdrawn from consideration.
- 5) ☒ Claim(s) 13-18 is/are allowed.
- 6) ☒ Claim(s) 1-3 is/are rejected.
- 7) ☒ Claim(s) 4-6 is/are objected to.
- 8) ☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☐ The drawing(s) filed on _____ is/are: a) ☐ accepted or b) ☐ objected to by the Examiner.
Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).
Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

- 12) ☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☐ All b) ☐ Some * c) ☐ None of:
- ☐ Certified copies of the priority documents have been received.
 - ☐ Certified copies of the priority documents have been received in Application No. _____.
 - ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

HSIEN-MING LEE
PRIMARY EXAMINER

10/5/2004

Attachment(s)

- 1) ☐ Notice of References Cited (PTO-892)
- 2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
- 3) ☐ Information Disclosure Statement(s) (PTO-1449 or PTO/SB/08)
Paper No(s)/Mail Date _____
- 4) ☐ Interview Summary (PTO-413)
Paper No(s)/Mail Date. _____
- 5) ☐ Notice of Informal Patent Application (PTO-152)
- 6) ☐ Other: _____

DETAILED ACTION

Remarks

1. Claims 1-6 and 13-18 are pending in the application.

Claim Rejections - 35 USC § 103

2. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

3. Claims 1-3 are rejected under 35 U.S.C. 103(a) as being unpatentable over Chung et al. (US 6,184,142) in view of applicants admitted prior art ("AAPA").

In re claims 1-2, Chung et al., in Figs. 6A-6F and related text, teach the claimed method providing a semiconductor device, the semiconductor including a first layer 113/116/112 desired to be etched, the method comprising the steps of:

- (a) providing by depositing an antireflective coating (ARC) layer 114 (Fig. 6A), which is a SiON having antireflective properties (col. 4, lines 30-32);
- (b) patterning a first resist layer 130, the first resist layer 130 including a pattern having a singular aperture therein for etching a first portion (i.e. the portion where a dual damascene opening to be formed) of the first layer 113/116/112 (Fig. 6A);
- (c) etching the first portion of the first layer 113/116/112 to form a via (Figs. 6C);
- (d) removing the first resist layer 130 utilizing a plasma etch with O₂ plasma (Figs. 6A-6B), the ARC being resistant to the plasma etch (see previous office action, page 4, second paragraph);

Art Unit: 2823

- (e) patterning a second resist layer 131, the resist layer 131 including a pattern having a plurality of apertures therein for etching a second portion of the first layer 113/116/112 (Fig. 6D); and
- (f) etching the second portion of the first layer 113/116/112 to form a trench as shown in Fig. 6F (Figs. 6E-6F).

Chung et al. do not teach that the first resist layer 130 has a plurality of apertures.

However, AAPA, teaches providing the ARC layer 52 on a polysilicon layer 51; patterning a first resist layer 53, the first resist layer 53 including a pattern having a plurality of apertures therein for etching a first portion of the polysilicon layer 51 to form plural gate stack in a memory region 42 and patterning a second resist layer (step 22 in Fig. 1), the second resist layer having a plurality of apertures because it forms plural gates in Logic region (step 24 in Fig. 1).

Therefore, it would have been obvious to one of the ordinary skill in the art, at the time of the invention was made, to apply the method of Chung et al. to a situation where it needs the plurality of apertures in the resist pattern, as taught by AAPA, since by this manner it would provide a ground for the subsequent processing steps in forming plural gate stack.

As far as the thickness of the ARC layer is concerned, Chung et al. further teach that the ARC layer has a thickness of between about 500 to 1,000 Angstroms (col. 3, lines 46-52). The thickness range "between about 500 to 1,000 Angstroms" allows for thickness slightly less than 500 Angstroms, which obviously teaches the use of a thickness within claimed range "less than about 500 Angstroms." See M.P.E.P. 2144.05 Obviousness of Ranges

In re claim 3, Chung et al. also teach using an oxygen plasma (col. 4, line 47) including a forming gas (i.e. oxygen-containing gas), the ARC layer being resistant to the plasma etch

Art Unit: 2823

because Chung et al. suggest a desirability of protecting the low-k dielectric layer from oxygen-plasma etching damage during photoresist layer stripping (col. 1, lines 52-67).

Allowable Subject Matter

4. Claims 4-6 are objected to as being dependent upon a rejected base claim, but would be allowable if rewritten in independent form including all of the limitations of the base claim and any intervening claims.

5. Claims 13-18 are allowed.

6. The following is a statement of reasons for the indication of allowable subject matter:

The prior art of record neither teaches nor suggests that the plasma includes four percent of the forming gas (claim 4); the ARC layer is three hundred Angstroms plus or minus no more than approximately ten percent (claim 6); removing the SiON layer (claim 13); and removing the first resist layer after the first portion of the first layer is etched (claim 18).

Response to Arguments

7. Applicant's arguments filed 8/6/04 have been considered but are moot in view of the new ground(s) of rejection.

8. Any inquiry concerning this communication or earlier communications from the examiner should be directed to Hsien-Ming Lee whose telephone number is 571-272-1863. The examiner can normally be reached on Tuesday-Thursday (8:00 ~ 6:00).

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Olik Chaudhuri can be reached on 571-272-1855. The fax phone number for the organization where this application or proceeding is assigned is 703-872-9306.

Art Unit: 2823

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free).

Hsien-Ming Lee
Primary Examiner
Art Unit 2823

Oct. 5, 2004

HSIEN-MING LEE
PRIMARY EXAMINER

Lee
10/5/2004